REMARKS

Upon entry of the foregoing amendments, claims 5, 7, 9, 11, 32, 33, 36, 41-43, 46, 47, 49-55 are pending in the application. Claims 6, 8, 10-31, 34-35, 37-40, 44, 45, 48, and 56 are canceled without prejudice to or disclaimer of the subject matter therein. Claims 1-4 and 57-62 were previously canceled. Claims 5, 7, 9, 11, 32, 33, 36, 41-43, 46, 47, and 49-55 are sought to be amended. No new matter is introduced by these amendments and their entry is respectfully requested.

In view of the below remarks, Applicants believe the claims are in condition for allowance and reconsideration is respectfully requested.

Allowable Subject Matter

Applicants acknowledge with appreciation the Examiner's indication that claims 50-55 are allowable. Claims 50-55 are amended to correct various typographical errors and misspellings. No new matter has been added by these amendments.

Specification

Pages 1, 3-4, 8-9, 11-15, 20, 32, 44-49, 55, 65-70, 73-78, and 82 of the Specification were objected to because there are inerasable marks. The Examiner's objection is noted; however, Applicants respectfully request that the Examiner reconsider and withdraw this objection because a clean copy of the Specification (without such marks) is available as U.S. Publication No. 2002/0015532.

Rejections under 35 U.S.C. § 112

Claims 36, 40, and 43-45 are rejected under 35 U.S.C. § 112 as being indefinite for failing to particularly point out and distinctly claim the subject matter. Applicants respectfully traverse this rejection. However, in order to expedite the prosecution of this application, Applicants have amended claims 36 and 43. Claims 40, 44, and 45 have been canceled, thereby rendering their rejection moot.

Rejections under 35 U.S.C. § 102

Claims 5-13, 32-39, 46-49, and 56 were rejected under 35 U.S.C. § 102(e) as allegedly being anticipated by U.S. Patent No. 5,862,262 to Jacobs *et al.* ("Jacobs"). Applicants respectfully traverse this rejection. Claim 56 is canceled, thereby rendering its rejection moot.

The present invention provides methods based on Netwonian polynomial space and characterizes the images to be compressed with singular manifold representations called *catastrophes*. These singular manifold representations can be represented by polynomials, which can be transformed into a few discrete numbers called "datery" (number data that represent the image). In general, these polynomials are chosen to represent the surfaces and are then reduced to compact tabulated normal form polynomials, which comprise simple numbers (i.e. the datery) that can be represented with very few bits. This results in high compression rates.

Jacobs, on the other hand, discloses a method for encoding an image as an iterated transformation image compression system. Within the system, an image is represented by an array of pixels defining an image area, and each pixel is defined by a three-dimensional vector (having x, y, z coordinates) identifying the position of the pixel in the array and an intensity level of the pixel. The system, according to Jacobs, first partitions an image into ranges and domains. Using principles of the iterated transformation process, a transformation is generated for each domain, wherein each transformation is a 3 x 3 matrix identifying positional scaling coefficients and an intensity scale coefficient, and a 3 x 1 vector identifying positional offset coefficients and intensity offset coefficient. Once each domain's transformation is optimized in terms of the intensity scaling and offset coefficients, each optimized transformation can be compared with a range to provide error data as a function of the difference between them. A domain and corresponding optimized transformation is selected that minimizes the error data. This is repeated using a chosen plurality of ranges, resulting in corresponding optimized transformations associated with the chosen plurality of ranges. Information identifying each of the chosen plurality of ranges and the selected domains and corresponding optimized transformations is compactly stored as an encoding of the image.

A. Jacobs does not teach or suggest a catastrophe

Claim 5 is patentable over Jacobs because Jacobs does not teach or suggest each and every limitation as recited in claim 5. Specifically, Jacobs fails to teach or suggest the limitations of "identifying at least one catastrophe...," and "representing said catastrophe with a canoncial polynomial..." because Jacobs does not teach or suggest a catastrophe as recited in the claims.

The Examiner asserts in section 7 of the Action that Jacobs teaches "identifying at least catastrophe in image by defining digital image as plurality of points [discrete structure/point] having x,y,z coordinates," that "these coordinate represent cannonical polynomial," and that the "mapping process in which x,y,z coordinates system is used to define a domain Di...[where] polynomial/function f(x,y,z) representing the sub area of the image is equivalent transforming canonical polynomial into datery [area]." Applicants respectfully disagree with these assertions and respectfully traverse the rejection.

The term "catastrophe" is known to those of skill in the art as a point of abrupt change. According to the specification, the term was coined by the French mathematician Paul Antoine Aristide Montel. The patent application specification defines catastrophe as "a specific manifold mapping feature by which some points lying in the projection plane can abruptly change location in manifold." The specification goes on to further define catastrophe as "the emergence of discrete structures from the typical surface described in the platform of continuum" (See page 18, lines 7-11). In turn, the specification defines discrete structures as "singular manifolds that can be described by a set of discrete, usually even, data (e.g., (2,5,-1,3)), leading to datery instead of description by a continuum of points (such as $F(x,y,z)=0$)" (See page 19, lines 16-18). The specification teaches datery as simple numbers used to represent polynomials that represent an image as singular manifolds (See page 6, lines 9-11). For example, in one embodiment, the invention teaches the datery as simply coefficients of polynomials (See page. 57, lines 14-15).

Nowhere does Jacobs teach or suggest identifying a catastrophe. Jacobs teaching of defining the image as a plurality of x,y,z points is nothing more than the well known representation of image data as pixels having positional coordinates (x,y) and an intensity coordinate, z. Jacobs makes no teaching or suggestion whatsoever of evaluating those points to identify catastrophes. Jacobs' mere teachings of representing the image with a plurality of

datapoints having x,y,z coordinates is nothing more than a simple representation of pixel location and intensity. This basic teaching of representing an image with a set of pixel data does not teach or suggest "identifying a catastrophe in an image" as recited in claim 5.

Moreover, the catastrophes, as described in the specification, are singular manifolds described by a set of discrete data, which can lead to datery, as also recited in the claim. In contrasts, Jacobs' teachings of a plurality of points having x,y,z coordinates are not singular manifolds described by a set of discrete data leading to datery. Despite the Examiner's assertion, catastrophes are not taught or suggested by Jacobs' mere plurality of points having x,y,z coordinates.

Accordingly, Jacobs' plurality of pixels having x,y,z coordinates does not teach or suggest a catastrophe, and Jacobs' plurality of points does not represent canonical polynomials. For at least these reasons, claim 5 is patentable over Jacobs.

Claim 7 recites limitations similar to those in claim 5 with regard to catastrophes and canonical polynomials. Accordingly, claim 7 is patentable over Jacobs for at least the reasons provided with respect to claim 5, in addition to its own novel limitations.

B. Jacobs does not teach or suggest use of canonical polynomials

Additionally, claim 5 is patentable over Jacobs because Jacobs does not teach or suggest each and every limitation as recited in claim 5. Specifically, Jacobs fails to teach or suggest the limitations of "representing said catastrophe with a canoncial polynomial...," and "transforming said canonical polynomial into datery" because Jacobs does not teach or suggest use of canonical polynomials as taught by the invention.

Jacobs does not even teach or suggest using canonical polynomials to represent an image. The canonical polynomials are identified in the invention as fourteen polynomials defined on page 50 of the specification. Jacobs, rather, utilizes a polynomial/function of $f(x,y,z)$ representing a sub area of the image, which is not one of the canonical polynomials as taught by the invention. Specifically, FIG. 2 illustrates how an x,y,z coordinate system is utilized to define a domain D_i which is a subset of the area that comprises the entire image area. The x,y,z coordinate system is not commensurate with the teaching of canonical polynomials in accordance with the invention.

Moreover, as noted above, the datery are simple numbers used represent polynomials that represent an image as singular manifolds. Jacobs' teachings of a mere plurality of points alone does not teach or suggest polynomials that represent an image as singular manifolds.

Claim 46 as amended recites limitations similar to claim 5 with regards to canonical polynomials. Accordingly, claim 46 is patentable over Jacobs for at least the reasons provided with respect to claim 5 and canonical polynomials and, further, in view of its own features.

C. Dependent claims

Claims 9, 32, 33, 36, 41-43, and 47, 49 depend from one of independent claims 5, 7, and 46 and are thus patentable over Jacobs for at least the reasons provided with respect to them and, further, in view of their own features. Applicants respectfully request that the Examiner reconsider and withdraw this rejection.

D. Canceled Claims

Claims 6, 8, 10-31, 34-35, 37-40, 44, 45, 48, and 56 are canceled and, therefore, rejections with respect to these claims are rendered moot.

Rejections under 35 U.S.C. § 103

Claim 40-45 were rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over Jacobs. Applicants respectfully traverse this rejection. Claims 40, 44, and 45 have been canceled thereby rendering their rejection moot.

Claims 41-43 depend from independent claim 7 and are thus patentable over Jacobs for at least the reasons provided with respect to claim 7. Applicants respectfully request that the Examiner reconsider and withdraw this rejection.
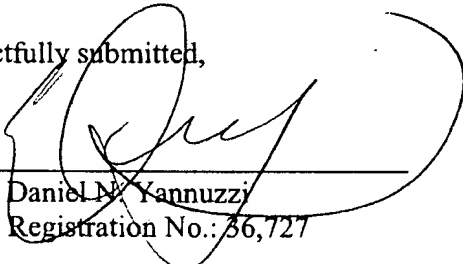
CONCLUSION

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to withdraw the outstanding rejection of the claims and to pass this application to issue. If it is determined that a telephone conference would expedite the prosecution of this application, the Examiner is invited to telephone the undersigned at the number given below.

In the event the U.S. Patent and Trademark office determines that an extension and/or other relief is required, applicant petitions for any required relief including extensions of time and authorizes the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to Deposit Account No. 50-4562 referencing the Atty. Docket No. noted above. However, the Commissioner is not authorized to charge the cost of the issue fee to the Deposit Account.

Dated: February 23, 2009   Respectfully submitted,

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